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(54) Antiperspirant aerosol composition and method of making same

(57) A suspension antiperspirant aerosol composition for topical application to the human skin comprising 1-30% by weight of solid activated aluminium chlorohydrate, 1-30% by weight of a liquid masking agent 30-90% of a propellant for expelling the composition from a container and a carrier.

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Description

This invention relates to aerosol antiperspirant compositions suitable for topical application to the human skin.

Antiperspirant compositions suitable for topical application typically contain an antiperspirant material such as aluminum chlorohydrate which acts to suppress the level of perspiration on the area of the body to which it is applied. Antiperspirant compositions are widely applied in the form of a pressurized propellant driven aerosol spray.

Aerosol antiperspirant compositions typically have the antiperspirant material suspended in an anhydrous vehicle together with a propellant and a suspending agent. Other minor ingredients can also be present, and the composition is housed in a pressurised container.

A major problem associated with all antiperspirants, including aerosol antiperspirants, is that of deposition or whitening where the antiperspirant active, which is usually in powder form, is deposited on a user's clothes or skin thereby causing visible whitening/staining and occasionally damage to the clothes.

Various attempts have been made to reduce the whitening or visible deposits. A widely used approach has been to incorporate masking oils such as aliphatic hydrocarbons, esters and siloxane fluids into antiperspirant formulations. Generally, the masking oils also have an emollient effect.

The masking oils function by coating the surface of the antiperspirant active particles to minimise scattering of light, thereby rendering the active less visible to the naked eye.

The masking method has been found to reduce whitening in stick and roll-on products. However, the reduction of whitening in aerosol compositions containing activated aluminium chlorohydrate (AACH) as the active has been less effective.

It has proven particularly difficult to match the Refractive Index (RI) of the masking oil with that of AACH, as commercially available AACH does not have a continuous RI value throughout the particle. More particularly, AACH particles generally contain hollow cores, having an RI of 1.0 while the RI of the outer particle is in the region of 1.5 which results in visible whitening.

An object of the invention is to provide an improved aerosol antiperspirant composition, particularly one comprising a particulate antiperspirant active, having reduced visible whitening.

A further object of the invention is to provide a method for producing an antiperspirant composition having reduced visible whitening.

According to the invention there is provided a suspension antiperspirant aerosol composition for topical application to the human skin comprising 1-30% by weight of solid or non-hollow activated aluminium chlorohydrate, 1-30% by weight of a liquid masking agent, 30-90% of a propellant for expelling the composition from a container and a carrier.

Preferably, the activated aluminium chlorohydrate comprises non-hollow particles. By "non-hollow" in this context is meant particles which contain no cores or voids which have a diameter of greater than 40% of the particle diameter. Preferably, any cores or voids are less than 30% of the particle diameter, more preferably less than 20% of the pareticle diameter, even more preferably less than 10% of the particle diameter, most preferably less than 5% of the particle diameter. Suitably, the activated aluminium chlorohydrate has a continuous Refractive Index. Preferably, the aluminium chlorohydrate has a Refractive Index of 1.52 to 1.57 and the masking agent has a Refractive Index of 1.40 to 1.57.

A preferred method of obtaining such AACH with no or very small cores or voids is to obtain AACH with very large particle sizes (e.g 100 microns or more), and reduce these particles in size by grinding or milling them.

More preferably, the masking agent is selected from the group comprising benzoate esters, hydrogenated polybutene, PPG-14 butyl ether, isopropyl palmitate, phenylsilicone and isopropylmyristate.

In an alternative embodiment the invention relates to the use of a solid (i.e. non-hollow) activated aluminium chlorohydrate in the preparation of an antiperspirant composition.

AACH antiperspirant actives and methods for producing same suitable for use in the present invention are described in GB 1,568,831, GB 1,597,497, GB 1,597,498, EP 6,738, EP 6,739, EP 7,191, EP 191,628, EP 256,832 and EP 491,395 the contents of which are incorporated herein by reference.

The particulate material is suspended in a hydrophobic emollient liquid masking agent. The masking agent improves initial adhesion of the antiperspirant active to the skin, thus aiding in the capture of the antiperspirant material by the skin as it is dispensed in spray form. Also, the agent serves as a diluent, lubricant or spreading agent to facilitate uniform distribution of the antiperspirant material on the skin.

Suitable emollient liquid masking agents are disclosed in US Patent Nos. 4,822,596 and 4,904,463, the disclosures of which are specifically incorporated by reference herein. The amount of emollient liquid masking agent in the composition according to the invention may preferably vary from 1-30% by weight of the total composition.

Preferred emollient masking agents are the Finsolv (Trade Mark) Benzoate Esters available from Finetex Inc. and Panalane, a hydrogenated polybutene, available from Amoco, Fluid AP (Union Carbide), isopropyl palmitate, phenylsilicone, and isopropyl myristate.

In an alternative embodiment of the invention, the liquid emollient carrier element of the composition comprises a volatile silicone fluid. Preferred volatile fluids for use in compositions according to the invention include dimethyl cy-

cyclosiloxanes, such as DC244, DC245, DC344 and DC345 fluids (Dow Corning).

In order to prevent caking or settling out of the antiperspirant salt in the hydrophobic emolliant liquid carrier, a bulking or suspending agent is preferably incorporated into the composition of the invention. The suspending agent is preferably a hydrophobically treated montmorillionite clay such as bentonites and hectorites. One such commercially available clay is Bentone-38, which is hectorite clay available from NL Industries, Inc. The amount of clay in the composition of the invention may preferably vary from 0.2-5.0% by weight of the total composition.

The propellant gas according to the invention can be any liquefiable gas known in the art for use in propellant driven aerosol containers. Examples of suitable propellants include trichlorofluoromethane, trichlorotrifluoromethane, difluoroethane, propane, butane or isobutane or combinations thereof. The amount of propellant in the composition of the invention is conveniently no more than 90 wt%.

Other minor ingredients which can be present in compositions according to the invention include:

- cosmetically acceptable vehicles, such as straight and branched chain alcohols, for example, ethanol, isobutanol or isopropanol;
- deodorant active perfumes and deodorant compounds which can act as antimicrobial agents;
- hydrophobic oils, such as liquid paraffin oils;
- inorganic electrolytes, such as sodium chloride or sodium sulphate;
- other thickeners such as clays, silicas, for example, Aerosil 200 and hydroxypropyl celluloses such as Klucel;
- polar additives such as propylene carbonate or alcohol;
- skin feel improvers, such as talc and finely divided polyethylene such as Accumist B18;
- humectants, such as polyols, for example glycerol;
- perfumes;
- preservatives and antioxidants;
- skin benefit agents such as allantoin;
- colours;
- other cosmetic adjuncts conventionally employed in propellant driven aerosol products.

Whilst not wishing to be bound by any theory Applicant believes that the poor masking associated with the aerosol antiperspirant compositions of the prior art is due to the morphology of the antiperspirant actives used in aerosol compositions.

The active used in suspension stick and roll-on products is AZAG. AZAG particles are irregular in shape and have a mean particle diameter of about 2 microns. The particles are solid in nature and are obtained from milling larger particles. The "whiteness" of skin deposits using suspension stick and roll-on products is usually more intense than for aerosol due to the use of the smaller particle sizes in such products which causes more light scattering surfaces to be exposed to the light.

Smaller particle sizes are used to avoid settling out of the active during setting of stick antiperspirants and with rollons to facilitate resuspension. Conversely, larger macropsherical actives are utilized in aerosol formulations partly for reasons of safety.

The favoured aerosol active is AACH, in the form of near-spherical particles of mean diameter for example 20-30 microns, which can be produced by reducing in particle size particles which originally had a size in the region of 100 microns. The original particles have a hollow core i.e. are in the form of a shell enclosing a hollow air-containing core. Masking oils help to eliminate whitening as previously described. However, it is believed that while the refractive index of the oil can be matched with the particle shell to reduce visible masking a refractive index mismatch between the shell and the hollow core remains. Hence processing to remove the hollow core, and hence the differential in Refractive Indices, is beneficial.

More particularly, the antiperspirant active has a Refractive Index (RI) of 1.52-1.57, that of the oils is 1.40-1.57.

and the RI of air is 1.00. It is believed that the core-shell interface acts as the main scattering source in the presence of the oil to cause the excessive visible whitening experienced with aerosol formulations.

Examples

The invention will now be further described by way of example only. The following compositions were prepared using standard techniques known in the art.

1. Comparative

A supplier produced solid (i.e. no entrapped air) aluminium chlorohydrate Locron S (ex Hoechst) active of large particle size (e.g. around 100 microns) was milled down to a mean particle size of 30 microns, which is comparable with that of an AACH active (ex Giulini), and these were combined with four masking oils to determine the percentage whiteness reduction.

The whiteness measurement is that obtained for a sprayed deposit (i.e. active) weight of 0.2g.

The results are given in the table below. The results show that the level of whiteness (as measured using digital image analysis under controlled lighting conditions) for the two actives (AACH and milled ACH) are very close in the absence of masking oil. In the presence of oils the level of whiteness of the ACH is, in all cases, less than that of the AACH. The percentage whiteness reduction is given in brackets.

	No Oil	Finsolv TN	Silkflo 364NF	Panalene L-14E	Cosmacol PLG
AACH	27500	17000 (38%)	18380 (33%)	21130 (23%)	15200 (55%)
ACH	26750	12500 (53%)	16250 (39%)	16250 (39%)	5000 (81%)

It should be noted that the refractive indices of the AACH and ACH are 1.52 and 1.53 respectively. Accordingly, differences in masking cannot be explained by a differences in the RI values of the actives.

Accordingly, a milled AACH particle which is solid i.e. does not contain a hollow core or is not a hollow spheroid particle would clearly result in reduced whitening.

The AACH active could be prepared as described in the aforementioned references incorporated herein.

2. Compositions

A packaged propellant driven aerosol antiperspirant composition was prepared having the following formulation:

FORMULATION	
ACH/AACH	10%
Bentone 38	1%
Volatile silicone Q2/1465	3.5%
Perfume	0.5%
CAP 30	75%
Masking Oil	10%

The masking oils were substituted into the formulation at a level of 10% replacing 10% of the volatile silicone.

3. Whiteness Reduction

The following example shows the results of varying in a standard antiperspirant aerosol composition the level of a masking agent fluid and antiperspirant active, in particular with regard to the morphology of the antiperspirant active. The "base" composition for the aerosol contained the amounts of masking agent and antiperspirant active shown along with 13% volatile silicone, 1% Bentone 38, and the balance being bentone/propane/isobutane propellant.

In such a sprayed aerosol composition, under consistent spray and observation conditions, a Quantitative Descripter Analysis (QDA) score was attributed to various aerosol formulations in which the level of masking fluid and nature of antiperspirant salt was varied.

Results

Antiperspirant Active	% Fluid AP (MASKING AGENT)	QDA Deposits Score
10% AACH (conventional)	0	57
10% AACH (conventional)	6	56
10% AACH (conventional)	10	51
10% ACH	6	38
10% milled AACH	6	15

The results show that the addition of increasing levels of masking agent to normal AACH (having a hollow core) has a relatively small effect on perceived whiteness. However by milling the AACH and thereby eliminating the hollow core of AACH particles, a large reduction in perceived whiteness is observed. The reduced whiteness of ACH compared to AACH further emphasises the importance of the hollow core in AACH particles in determining perceived whiteness.

4. Whiteness Reduction

Again a standard antiperspirant aerosol composition containing varying amounts of antiperspirant active and masking fluid in the same aerosol base as described in Example 3. The whiteness was measured by image analysis techniques. The figures in parentheses indicate the change in whiteness compared to the standard of 10% hollow AACH with no masking oil.

		Masking Oil (%w/w)	
Formulation	0	6	10
10% AACH	27500	24000 (-166)	17000 (-38%)
10% ACH	26750 (-3%)	-	12,5000 (-55%)
10% milled AACH	30,800 (+12%)	12750 (-54%)	-

Hence the figures indicated that with milled AACH, a huge reduction in whiteness can be attained for the use of relatively little masking oil compared with similar formulations containing ACH and unmilled AACH.

Claims

1. A suspension antiperspirant aerosol composition for topical application to the human skin comprising 1-30% by weight of solid activated aluminium chlorohydrate, 1-30% by weight of a liquid masking agent 30-90% of a propellant for expelling the composition from a container and a carrier.

2. An aerosol composition as claimed in claim 1 characterized in that the activated aluminium chlorohydrate comprises non-hollow particles.

3. An aerosol composition as claimed in claim 2 characterised in that the activated aluminium chlorohydrate has a continuous Refractive Index.

4. An aerosol composition as claimed in claim 3 characterised in that the activated aluminium chlorohydrate has a Refractive Index of 1.52 to 1.57.

5. An aerosol composition as claimed in claim 4 characterised in that the masking agent has a Refractive Index of 1.40 to 1.57.

6. An aerosol composition as claimed in claim 5 characterised in the masking agent is selected from the group comprising benzoate esters, hydrogenated polybutene, PPG-14 butyl ether, isopropyl palmitate, phenylsilicone and isopropylmyristate.

7. Use of a solid activated aluminium chlorohydrate in the preparation of an antiperspirant composition.

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EUROPEAN SEARCH REPORT

Application Number
EP 97 30 1077

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
Y	EP 0 396 137 A (GILLETTE) 7 November 1990 * page 2, line 1 - page 3, line 30; claims 1-10; examples 5,6 *	1-7	A61K7/32 A61K7/38
D,Y	GB 1 568 831 A (UNILEVER) 4 June 1980 * claims 1-6,8,9,11,20-22; example 17 *	1-7	
A	EP 0 388 111 A (PROCTER & GAMBLE) 19 September 1990 * claims 1-10; example III *	1-7	
A	EP 0 549 223 A (DOW CORNING) 30 June 1993 * page 4, line 34 - line 35; examples 1,3 *	1-7	
A	EP 0 452 762 A (GENERAL ELECTRIC) 23 October 1991 * claims 1-31; table 1 *	1-7	
A	EP 0 373 499 A (COLGATE-PALMOLIVE) 20 June 1990 * page 2, line 30 - line 38; claims 1-9 *	1-7	

TECHNICAL FIELDS SEARCHED (Int.Cl.6)
A61K

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	11 September 1998	Willekens, G

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

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(54) Skin cooling anti-perspirant aerosol compositions

(57) Anti-perspirant aerosols comprising a dimethicone and dimethicoconol gum, e.g Q2-1401, silicone fluids, e.g. cyclomethicone, and hydrocarbon propellants, e.g. butane, isobutane or propane, have a cooling effect on the skin and impart a fresh feeling to the user. The silicone gum acts to convey the cooling agent(s) to the skin where they are slowly volatilised by body heat thereby generating a cooling effect.

GB 2 314 021 A

ANTIPERSPIRANT COMPOSITION

The present invention relates to antiperspirant compositions. More particularly, the invention relates to aerosol compositions having improved cosmetic characteristics.

Antiperspirant and deodorant compositions can be applied to the skin by a variety of methods. Generally, such compositions comprise a carrier vehicle material in addition to an antiperspirant and/or deodorant active, the carrier and active being selected in accordance with factors such as the method of application, the intended use, the desired rheology and the desired cosmetic characteristics.

Aerosol compositions have gained wide consumer acceptance. Aerosol antiperspirant compositions generally comprise an anhydrous system comprising an antiperspirant salt dispersed in a liquid vehicle together with the liquified volatile propellant in a pressurised aerosol container.

Consumers can be divided into two classes - those who favour the use of antiperspirant aerosol compositions and those who favour deodorant aerosol compositions. Deodorant aerosol compositions do not contain significant amounts of antiperspirant active while the presence of the antiperspirant active in antiperspirant aerosol compositions imparts different cosmetic or sensory properties to the antiperspirant aerosol compositions. Generally, deodorant composition contain high levels (usually 50% or over) of alcohol, which has a deodorising effect and which imparts an exceptionally cold or fresh feeling to the deodorant composition.

Conversely, antiperspirant compositions are usually incompatible with high levels of alcohol and generally do not impart a sufficiently cold feeling.

Many consumers therefore choose deodorants over antiperspirants in order to achieve a cold or fresh feeling on application. However, deodorants unlike antiperspirants fail to prevent sweat generation and also exhibit poor malodour reduction over time.

Accordingly, consumers who initially select an aerosol deodorant over an antiperspirant for initial freshness fail to enjoy the long term benefits of an antiperspirant.

US 4,152,416 describes aerosol antiperspirant compositions capable of dispensing an astringent solid with low mistiness and dustiness. A polymer gum is used in the aerosol composition to reduce the mistiness and/or dustiness of the aerosol composition.

US 4,806,338 also describes the use of amino functional silicones in antiperspirant aerosol compositions in order to improve the cosmetic properties of the composition. Moreover, US 4,806,338 implies that the use of such silicones helps to prevent undesirable cooling on the skin.

EP 343,843 of the Mennen Company also describes the use of a substantivity fluid made up of a silicone polymer dissolved in a carrier fluid to prevent clogging of aerosol valves at low delivery rates.

An object of the invention is to provide an aerosol antiperspirant composition which provides the sensory benefits of an aerosol deodorant.

According to the invention there is provided a method of cooling skin comprising conveying a propellant composition to the skin as an aerosol, depositing the propellant on the skin and slowly volatilising the propellant to create a skin cooling sensation. Preferably, the propellant composition further comprises an antiperspirant active.

More preferably, the propellant has a boiling point between -45°C and +5°C.

Advantageously, the propellant is conveyed and deposited on the skin by a propellant-polymer mix. Preferably, the propellant-polymer mix comprises a silicone polymer. The silicone polymer can be a silicone gum or a silicone fluid.

In an alternative embodiment, the invention discloses the use of a silicone polymer as a skin cooling agent in the preparation of an aerosol composition comprising a antiperspirant active. The silicone polymer can be a silicone gum or a silicone fluid. Preferably, the silicone gum has a viscosity from 0.5 to 100 $m^{-2}sec^{-1}$ at 25°C.

Suitably, the silicone gum is a polydimethylsiloxane gum, preferably a dimethicone and/or dimethiconol gum.

Accordingly, the present invention provides an antiperspirant composition having the skin cooling benefits of a deodorant composition.

Accordingly, a consumer can enjoy the sensory benefits of a deodorant and the efficacy of an antiperspirant.

The particulate antiperspirant material of the invention can be any of the known antiperspirant active materials. Particularly preferred materials are astringent metallic

salts, in particular the inorganic and organic salts of aluminium, zirconium and zinc and mixtures thereof. Particularly preferred are the aluminium and zirconium salts such as aluminium halides, aluminium hydroxide halides, zirconium hydroxy halides, zirconium oxide halides and mixtures thereof. Generally, such aluminium and/or zirconium salts are any of those well known in the art. US patent no. 4,152,416 describes various aluminium zirconium salts which are suitable for use in the present invention. Typically, the antiperspirant active is present at from about 0.1% to about 20% by weight of the composition.

Generally, the silicone gums suitable for use in the present invention are as defined in US 4,152,416 and have a viscosity ranging from about 0.5 to 100 m^2sec^{-1} (500,000 to 100,000,000 centistokes) at 25°C. Typical silicone gums are the polydimethylsiloxane polymers such as dimethiconol and dimethicone gums.

The silicone gum is preferably present at levels from about 0.05% to about 6% by weight, more preferably from about 0.1% to about 4% by weight of the composition.

Alternatively or in addition to the silicone gum, silicone fluids can also be used to generate a cooling effect according to the invention. Suitable fluids are the DC200 series of silicones available from Dow Corning.

The aerosol antiperspirant compositions of the present invention also preferably contain additional solvent or carrier material. Particularly preferred are volatile low viscosity fluid components.

The term "volatile" does not exclude materials that are only slowly volatile and require a longer time to evaporate than the known volatile silicones.

A particularly preferred series of volatile liquid carriers are the cyclomethicone liquids. Generally, the volatile low viscosity liquids usable in the present invention have a boiling point of at least 100°C and a viscosity of less than 1 x $10^{-5}m^2sec^2$ (10 centistokes) at 25°C. The volatile silicone fluids utilised at levels of about 1% to about 30%, preferably from about 2.5% to about 14.5% by weight of the composition.

Suitable silicone gums and volatile silicone fluids are available as standard proprietary material mixes or solutions e.g. Q21401 available from Dow Corning. SE30, a gum available from the General Electric Company can also be used.

The compositions of the invention also contain one or more volatile aerosol propellant materials which in a gaseous state carry the other components of the invention in particulate or droplet form. Suitable propellants have a boiling point in the range of from -45°C to about 5°C and are present at levels from about 3.5% to 90% by weight of the composition.

Suitable aerosol propellants are well known in the art and include the chemically inert hydrocarbons such as propane, n-butane, isobutane, cyclopropane and mixtures thereof.

The antiperspirant compositions of the present invention also comprise a suspending agent to suspend the antiperspirant actives. Suitable suspending agents include colloidal silicas and hydrophobic clays such as the bentonites. A particularly preferred bentonite is hydrophobic bentonite

e.g. Bentone which is a bentonite treated with hydrophobic cationic materials. Typically the suspending agents are utilised at from about 0.3% to 3% by weight of the composition.

In addition, masking agents to conceal antiperspirant active suitable for use in the compositions according to the present invention can be included. Suitable masking agents are selected from aliphatic hydrocarbons (e.g. C8-C30, preferably C10-C16, more preferable C12-C15 linear or branched hydrocarbons), aliphatic esters, aromatic esters and mixtures thereof. The preferred residue masking agents for use in the compositions according to the present invention are C8-C30, preferably C10-C16, more preferably C12-C15 mono- and di-alkyl esters of aromatic carboxylic acids inclusive of the benzoates and phthalates. Suitable masking agents include isopropyl myristate, isopropyl palmitate, polydecenes, Fluid AP, the Finsolv range of benzoate esters and mixtures thereof which can be used at ranges from 0.5% to 25% by weight of the composition.

In addition to the abovementioned ingredients customary adjuncts of aerosol antiperspirant compositions can also be included in the composition. Such adjuncts include perfumes, bactericides, fungicides, emollients and other skin treating materials.

The following are examples of compositions within the scope of the present invention. In the examples, all percentages of the specified ingredients are weight percentages.

EXAMPLE 1

Material	Chemical	Supplier	Level (%wt/wt)
AACH	Activated aluminium chlorohydrate	Giulini	2.0
Q2-1401	Dimethiconol gum in cyclomethicone	Dow Corning	1.0
	Cyclomethicone	Dow Corning	5.2
Bentone 38	Quaternium-18 hectorite	Rheox	0.8
	Perfume		1.0
	Butane/Isobutane/ Propane		90.0

EXAMPLE 2

Activated aluminium chlorohydrate	10%
Cyclomethicone	5.0%
Fluid AP	6.0%
Bentone 38	1.0%
Fragrance	0.5%
Q2-1401	2.5%
Propellant	75%

EXAMPLE 3

Activated aluminium chlorohydrate	1.0%
Cyclomethicone	7.6%
Bentone 38	0.3%
Fragrance	1.0%
SE 30	0.1%
Propellant	90%

EXAMPLE 4

Aluminium Chlorohydrate	10%
DC 344*	18.0%
Isopropyl palmitate	6.0%
Q2-1401	1.0%
Bentone 38	1.5%
Ethanol	10%
Fragrance	0.7%
Talc	2.8%
Propellant	50%

*DC 344 is a cyclomethicone tetramer available from Dow Corning.

EXAMPLE 5

Activated aluminium chlorohydrate	3.0%
DC 200 [60,000cS]	1.0%
Cyclomethicone	9.0%
Bentone 38	1.0%
Fragrance	1.0%
Propellant	85%

The following comparative data illustrate the effect of the presence of a silicone gum on the cooling effect of an aerosol antiperspirant formulation as described in Example I.

COMPARATIVE EXAMPLE 1

1. Thermal Imaging Data

The surface temperature of a patch of forearm skin was recorded using a calibrated Infra-red thermal imaging camera. The initial temperature recorded was 34.2°C.

Two aerosol products were sprayed onto the skin from a distance of 6 inches; a standard alcoholic deodorant made up of 50% propane, 0.5% perfume and 49.5% ethanol and a composition of the invention in accordance with Example 1. The temperature was recorded every ten seconds up to 90 seconds after application (Table 1). Table 1 clearly shows that for 1% Q2-1401, the skin was 4°C cooler following application than the alcohol deodorant and a temperature differential was maintained until approximately 30 seconds had elapsed.

Accordingly the data clearly demonstrates that antiperspirant aerosols of the invention have a cooling effect similar to if not better than an alcoholic deodorant.

TABLE 1: IR Imaging Data

		Time after application (s)								
		0	10	20	30	40	50	60	70	8
% Q2-1401	0.5	-0.3	22.9	26.8	28.6	29.8	30.3	31.0	31.2	31
	1.0	3	23.8	26.8	28.6	29.6	30.3	30.8	31.2	31

2. QDA Sensory data

A trained panel assessed the formulation of Example I to compare same with an alcoholic deodorant. The panel was asked to describe the sensory properties of a product in terms of Quantitative Descriptor Analysis i.e for each descriptor to give a score from 0 to 100 on the intensity experienced. For two products to be significantly different on an attribute typically a 20 point difference was required. The results are presented in Table 2. It can be seen that;

1) both products were as cold
2) Example 1 was drier
3) Example 1 stung less
4) both products were equally adhesive
5) both products were as fresh
6) Example 1 was less wet
7) Both products were as tightening
8) Both the products gave equally low deposits

TABLE 2: QDA Sensory Data

Attribute	Alcoholic deodorant	Example 1
Cold on application	68.1	66.2
Wet on application	43.4	21.7
Stings on application	36.1	12.9
Sticky after application	21.8	26.1
Fresh after application	55.9	68.1
Wet after application	40.7	18.7
Tight after application	13.3	21.9
Deposit level after application	8.5	17.3

TABLE 3: Deodorancy Test

This test was conducted on a panel of female subjects and results obtained after 24 hours. Each product was applied using a 2 second spray from a shaken can, 6 inches away from the axilla and deodorancy tested by a third party.

The results were as follows:

	Mean Malodour Score 24hr	Mean Dosage (mg)
Example 1	1.28	2010
Example 1 without silicone	1.39	1940
Deodorant	1.60	1950

Difference for significance @ 95% 0.14
Difference for significance @ 99% 0.19

In this evaluation no significant difference in deodorancy efficacy was found between the two AACH-containing products and both of these were superior to the ethanolic deodorant after a 24 hour wear period at a 99% level of confidence.

Accordingly, the compositions of the invention have the desirable sensory attributes of a deodorant (cooling and freshness), but benefits from antiperspirancy greater protection from malodour (>99% significantly less malodour than a deodorant after 24 hours) and is drier, and stings less.

Although the Applicants do not wish to be bound by any theory, it is believed that use of silicone gum in the antiperspirant compositions of the invention causes the propellant which is dissolved in the viscous gum to be conveyed to the skin surface. In prior art compositions propellant is not conveyed to the skin. Accordingly, in the present invention the propellant is volatilised by body heat at a slow rate thereby generating the desired deodorant type cooling effect.

In particular it is believed that any polymer material which raises the viscosity of the composition on the skin such that it retards evaporation of propellant may be suitable for conveying and depositing propellant on the skin surface.

CLAIMS

1. A method of cooling skin comprising conveying a propellant composition to the skin as an aerosol, depositing the propellant on the skin and slowly volatilising the propellant to create a skin cooling sensation.

2. A method as claimed in claim 1 characterized in that the propellant composition further comprises an antiperspirant active.

3. A method as claimed in claim 1 or claim 2 characterised in that the propellant has a boiling point between -45°C and 5°C.

4. A method as claimed in any of claims 1 to 3 characterised in that the propellant is conveyed and deposited on the skin by a propellant-polymer mix.

5. A method as claimed in claim 4 characterised in that propellant-polymer mix comprises a silicone polymer.

6. A method as claimed in claim 5 characterised in that the silicone polymer comprises a silicone gum.

7. A method as claimed in claim 5 characterised in that the silicone polymer is a silicone fluid.

8. Use of a silicone polymer as a skin cooling agent in the preparation of an aerosol composition comprising an antiperspirant active.

9. Use of a silicone polymer as claimed in claim 8 characterised in that the polymer is a silicone gum.

10. Use of a silicone gum as claimed in claim 9 characterised in that the gum has a viscosity from 0.5 to 100$m^{-2}sec^{-1}$ at 25°C.

11. Use of a silicone gum as claimed in claim 10 characterised in that the gum is a polydimethylsiloxane gum.

12. Use of a silicone gum as claimed in claim 11 characterised in that the gum is a dimethicone and/or dimethiconol gum.

The Patent Office

Application No: GB 9612477.1 **Examiner:** Mr S.J.Pilling
Claims searched: 1 to 12 **Date of search:** 28 August 1996

Patents Act 1977
Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.O): -

Int Cl (Ed.6): A61K 7/32

Other: ONLINE: CAS ONLINE, WPI

Documents considered to be relevant:

Category	Identity of document and relevant passage		Relevant to claims
X	GB 1589230	(SPITZER *ET AL*) see page 2 line 47 to page 3 line 3, page 3 lines 38 to 51 and the examples.	1-11
X	EP 0452762 A2	(GENERAL ELECTRIC) see page 3 lines 28 to 47 and the examples.	1-11
X	EP 0343843 A2	(MENNEN COMPANY) see page 4 line 58 to page 5 line 15 and the examples.	1-12
X	EP 0334210 A2	(PROCTER & GAMBLE) see the examples.	1-5,7,8
X	WO 91/18587 A1	(PROCTER & GAMBLE) see the examples.	1-5,7,8
X	US 4863721	(BECK & BOLICH) see column 9 line 35 to column 11 line 16 and Example III.	1-5,7,8
X	US 4840786	(JOHNSON & BAKKEN) see the examples.	1-5,7,8
X	US 4806338	(SMITH) see column 5 lines 13 to 60 and the examples	1-11
X	US 4350605	(HUGHETT) see Example 1 and 2.	1-5,7,8
X	US 4226850	(PACKMAN & JEFFKIN) see Examples VII, X and XI	1,2

X Document indicating lack of novelty or inventive step
Y Document indicating lack of inventive step if combined with one or more other documents of same category.
& Member of the same patent family
A Document indicating technological background and/or state of the art.
P Document published on or after the declared priority date but before the filing date of this invention.
E Patent document published on or after, but with priority date earlier than, the filing date of this application.

The Patent Office

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Category	Identity of document and relevant passage	Relevant to claims

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.

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(54) Antiperspirants

(57) Compositions for controlling malodour and perspiration contain (a) 0.5 to 30 wt.% of an antiperspirant material (b) 0.5 to 25% of a residue masking agent with a refractive index above 1.40 and (c) 0.1 to 5% of a trihydroxystearin suspending agent. The active material may be aluminium chlorohydrate and the masking agent is e.g. an aliphatic hydrocarbon or ester, an aromatic ester, a 12 to 15C alkyl benzoate or especially FINSOLV TN (RTM). The trihydroxystearin is preferably used as THIXCIN (RTM). Compositions maybe in form of aerosols.

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ANTIPERSPIRANT COMPOSITIONS

TECHNICAL FIELD

The present invention relates to compositions and methods for the treatment or prevention of malodour associated with human perspiration which have a reduced tendency to leave antiperspirant/deodorant residue on the human skin.

BACKGROUND OF THE INVENTION

Antiperspirant compositions have become a part of many persons' personal care and grooming regimen. The antiperspirant active materials which have been typically used include astringent metallic (e.g., aluminium, zinc, and zirconium) salts such as salts of aluminium halides, aluminium hydroxyhalides, zirconyl oxyhalides, zirconyl hydroxyhalides, and complexes of aluminium, zirconium and amino acid (e.g., glycines). These materials can be formulated and delivered via suspensions and emulsions. Additionally, it is generally perceived as unpleasant for the antiperspirant composition to have a "wet" feel upon application to the skin. Hence, it is also desirable to deliver the antiperspirant active to the skin by a vehicle which minimises this feeling of wetness. The delivery vehicle must also not cause excessive staining of the user's clothing, and

should control or reduce chalky appearance on the skin (and potential rub-off onto the user's clothes) resulting from the antiperspirant active, suspension agent, or other material in the composition. For these reasons, a variety of volatile silicones and non-volatile silicone emollients, and combinations thereof, have commonly been utilized in liquid antiperspirant compositions for delivery of the antiperspirant active material.

The primary silicone material used in recent times for delivery of antiperspirant actives in roll-on liquid antiperspirant applications is volatile cyclomethicone. Volatile cyclomethicone provides a very dry feel upon application and has a low heat of evaporation. The low viscosity of the volatile fluids is also important for providing an easily flowable composition for roll-on or aerosol application. In many of these compositions, a relatively low level of certain low-volatility silicone fluids, or other low-volatility emollients such as paraffin oil (e.g., mineral oil) are also included. These low-volatility fluids generally have a high enough viscosity so that they remain deposited on the skin throughout a significant portion of the day. They also reduce appearance of, and consequently rub-off of, chalk-like residue formed from the antiperspirant composition's particulate ingredients and in addition they aid the adhesion of the active material. These low-volatility materials are typically utilized at relatively low levels (about 1% to about 12%) to minimise an undesirable "greasy" feel which they can impart.

Liquid roll-on antiperspirant compositions such as these are exemplified in numerous publications including US-A-4,863,721, Beck et al., issued September 5, 1989. EP-A-330,140, published August 30, 1989, and US-A-4,423,041, Clum et al., issued December 27, 1983.

Other liquid emollients have also been used in liquid anti-perspirant compositions. These include paraffins such as mineral oil, and a variety of alcohols and esters of alcohols and fatty acids. However, these emollients also have draw-backs which, typically, include skin irritation and greasy feel.

In addition to the delivery of an effective amount of antiperspirant/deodorant active material to the human skin it is further desired that the composition should leave minimal antiperspirant residue on the human and clothes. It has been found that improvements in both skin residue performance and consistent dosing can be achieved by careful selection of particular residue masking and suspending agents.

It is an object of this invention to provide compositions effective for delivering antiperspirant/deodorant performance in addition to improved dosing and reduced incidence of chalky appearance of residue on skin and clothes.

SUMMARY OF THE INVENTION

According to one aspect of the invention there is provided an antiperspirant /deodorant composition for controlling malodour and perspiration comprising:

(a) from about 0.5% to about 30% by weight of an antiperspirant active material;
(b) from about 0.5% to about 25% by weight of a residue masking agent having a refractive index of greater than about 1.40;and
(c) from about 0.1% to about 5% by weight of a trihydroxy stearin suspending agent.

The essential as well as optional components of the present invention are described below. All levels and ratios are on a weight basis as a percentage of final composition unless otherwise specified.

DETAILED DESCRIPTION OF THE INVENTION

Applicant has found that in addition to delivery of effective antiperspirant/deodorant activity compositions demonstrating improved residue masking and consistent dosing characteristics can be achieved by careful selection of both the residue masking and suspension agents.

ANTIPERSPIRANT ACTIVE MATERIAL

An essential component of the present compositions is an antiperspirant active material. Any particulate compound or composition or mixture thereof having antiperspirant activity can be used. Astringent metallic salts are preferred antiperspirant materials for use herein, particularly including inorganic and organic salts of aluminium, zirconium, and zinc, and mixtures thereof. Particularly preferred are the aluminium and zirconium salts such as aluminium halides, aluminium hydroxy halides, zirconyl oxide halides, and zirconyl hydroxy halides, and complexes of aluminium, zirconium, and/or zinc with amino acids, e.g., glycines.

Specific, exemplary aluminium salts that can be used include aluminium chloride and the aluminium hydroxyhalides having the general formula $Al_2(OH)_aQ_b.XH_2O$ where Q is chloride, bromide, or iodide (preferably chloride); a is from about 2 to about 5, and a+b = about 6, and a and b do not need to be integers; and where X is from about 1 to about 6, and X does not need to be an integer. Particularly preferred are the aluminium chlorhydroxides referred to as "5/6 basic chlorhydroxide" wherein a is 5 and "2/3 basic chlorhydroxide" wherein a is 4. Aluminium salts of this type can be prepared in the manner described more fully in US-A-3,887,692, Gilman, issued June 3, 1975; US-A-3,904,741, Jones and Rubino, issued September 9, 1975; US-A-4,359,456, Gosling et al., issued November 16, 1982; and GB-A-2,048,229, Fitzgerald et al., published December 10, 1980. Mixtures of aluminium salts are described in GB-A-1,347,950, Shin, et al., published February 27, 1974.

The zirconium compounds which may be used in the present invention include both zirconium oxy salts and zirconium hydroxy salts, also referred to as the zirconyl salts and zirconyl hydroxy salts. These are preferred compounds for use herein and may be represented by the following general empirical formula:

$$ZrO(OH)_{2-nz}B_z$$

wherein z may vary from about 0.9 and to about 2 and need not be an integer; n is the valence of B; 2-nz is greater than or equal to O; and B may be selected from the group consisting of halides (preferably chloride), nitrate, sulfonate, sulfate, and mixtures thereof. Although only zirconium compounds are exemplified in this specification, it will be understood that

other Group IVB metal compounds, including hafnium, could be used in the present invention.

As with the basic aluminium compounds discussed above, it will be understood that the above formula is intended to represent and include compounds having co-ordinated and/or bound water in various quantities, as well as polymers, mixtures and complexes of the above. As will be seen from the above formula, the zirconium hydroxy salts actually represent a range of compounds having various amounts of the hydroxy group, varying from about 2.0 to only slightly greater than 0 groups per molecule.

Several types of antiperspirant complexes utilizing the above antiperspirant salts are known in the art. For example, US-A-4,120,948, Shelton, issued October 17, 1978 and US-A-3,792,068, Luedders et al., issued February 12, 1974, disclose complexes of aluminium, zirconium, and amino acids such as glycines. These complexes and other similar complexes with glycine amino acids are commonly known as ZAG complexes. ZAG complexes are useful herein are identified by the specification of both the molar ratio of aluminium to zirconium (hereinafter "Al:Zr" ratio) and the molar ratio of total metal to chlorine (hereinafter "Metal:Cl" ratio). ZAG complexes useful herein have an Al:Zr ratio of from about 1.67 to about 12.5 and a Metal:Cl ratio of from about 0.73 to about 1.93.

Also useful are the ZAG complexes disclosed in GB-A-2,144,992, Callaghan et al., published March 20, 1985. These ZAG actives, when analyzed by high pressure gel permeation chromatography, exhibit a distribution pattern having four or more successive peaks or "bands" where the height ratio of Banks IV to III is greater than 2:1.

More preferred are ZAG actives which have a total area under the curve of bands I and II of less than about 10%, preferably less than about 5%, more preferably less than about 2% and most preferably less than 1%. Preferred ZAG complexes can be formed by

(a) co-dissolving in water

(1) one part $Al_2(OH)_{6-m}Q_m$, wherein Q in an anion selected from the group consisting of chloride, bromide, and iodide; and m is from about 0.8 to about 2.0:

(2) x parts of $ZrO(OH)_{2-a}Q_anH_2O$, where Q is chloride, bromide, or iodide; a is from about 1 to about 2; n is from about 1 to about 8; and x is from about 0.16 to about 1.2;

(3) p parts neutral amino acid selected from the group consisting of glycine, dl-tryptophane, dl-β-phenyl-alanine, dl-valine, dl-methionine, and β-alanine, and where p is from about 0.06 to about 0.53.

(b) co-drying the resultant mixtures to a friable solid; and

(c) reducing the resultant dried inorganic-organic antiperspirant complex to a particulate form.

A preferred aluminium compound for preparation of such ZAG type complexes is aluminium chlorhydroxide of the empirical formula $Al_2(OH)_5Cl\ 2H_2O$. Preferred zirconium compounds for preparation of such ZAG-type complexes are zirconyl hydroxychloride having empirical formula $ZrO(OH)Cl\ 3H_2O$ and the zirconyl hydroxyhalides of the empirical formula $ZrO(OH)_{2-a}Cl_2\text{-}nH_2O$ wherein a is from about 1.5 to about 1.87, and n is from about 1 to about 7. The preferred amino acid for preparing such ZAG-type complexes is glycine of the formula $CH_2(HN_2)COOH$. Salts of such amino acids can also be employed in the antiperspirant complexes. See US-A-4,017,599, Rubino, issued April 12, 1977.

A wide variety of other types of antiperspirant complexes are also known in the art. For example, US-A-3,903,258, Siegal, issued September 2, 1975, discloses a zirconium aluminium complex prepared by reacting zirconyl chloride with aluminium hydroxide and aluminium chlorhydroxide. US-A-3,979,510, Rubino, issued September 7, 1976 discloses an antiperspirant complex formed from certain aluminium compounds, certain zirconium compounds, and certain complex aluminium buffers. US-A-3,981,896, issued September 21, 1976 discloses an antiperspirant complex prepared from an aluminium polyol compound, a zirconium compound and an organic buffer. US-A-3,970,748, Mecca, issued July 20, 1976, discloses an aluminium chlorhydroxy glycinate

complex of the appropriate general formula $[Al_2(OH)_4Cl][H_2CNH_2-COOH]$.

Of all of the above types of antiperspirant actives, preferred compounds include the 5/6 basic aluminium salts of the empirical formula $Al_2(OH)_5Cl\text{-}2H_2O$; mixtures of $AlCl_3$ $6H_2O$ and $Al_2(OH)_5Cl$ $2H_2O$ with aluminium chloride to aluminium hydroxychloride weight ratios of up to about 0.5; ZAG type complexes wherein the zirconium salt is $ZrO(OH)Cl$ $3H_2O$, the aluminium salt is $Al_2(OH)_5Cl$ $2H_2O$ or the aforementioned mixtures of $AlCl_3$ $6H_2O$ and $Al_2(OH)_5Cl$ $2H_2O$ wherein the total metal to chloride molar ratio in the complex is less than about 1.25 and the Al:Zr molar ratio is about 3.3, and the amino acid is glycine; and the ZAG-type complexes wherein the zirconium salt is $ZrO(OH)_{2-a}Cl_a$ $_nH_2O$ wherein a is from about 1.5 to about 1.87 and n is from about 1 to about 7, the aluminium salt is $Al_2(OH)_5Cl$ $2H_2O$), and the amino acid is glycine.

The most preferred antiperspirant actives useful in the compositions of the present invention are antiperspirant actives with enhanced efficacy due to improved molecular distribution. Aluminium chlorhydroxide salts, zirconyl hydroxychloride salts, and mixtures thereof having improved molecular distributions are known, having been disclosed, for example, in the following documents: US-A-4,359,456, Gosling et al., issued November 16, 1982; EP-A-183,171, Armour Pharmaceutical Company, published June 4, 1986; GB-A-2,048,229, The Gillette Company published December 10, 1980; EP-A-191,628, Unilever PLC, published August 20, 1986; and GB-A-2,144,992, The Gillette Company, published March 20, 1985.

The improved molecular distribution is determined by the known analysis method called gel permeation chromatography. This analysis method is described, for example, in several of the above patent specifications as well as in EP-A-7,191, Unilever Ltd., published January 23, 1980. It is preferred for purposes of the present invention that the antiperspirant actives utilized have enhanced efficacy due to improved molecular distribution with a ratio of peak 4 to peak 3 greater than about 0.1:1 as determined by gel permeation chromatography. This ratio, as is recognized by one skilled in the art, relates to the relative area under those

two peaks as measured by the gel permeation chromatography analysis method.

Highly desirable antiperspirant salts for use herein include aluminium chlorohydrex (sold under the name Rehydrol, by Reheis Chemical Company), aluminium chlorohydrex PEG, aluminium chlorohydrex PG, aluminium sesquichlorohydrate, aluminium sesquichlorohydrex PEG, aluminium sesquichlorohydrex PG, and mixtures thereof, particularly aluminium sesquichlorohydrate.

The compositions of the present invention contain from about 0.5% to about 30%, preferably from about 1% to about 20%, more preferably from about 5% to about 15% and especially from about 6% to about 12% by weight of antiperspirant active material.

Preferred antiperspirant materials suitable for use in the compositions according to the present invention are selected from aluminium halides and aluminium hydroxy halides and mixtures thereof. The most preferred antiperspirant material for use in the present invention is aluminium chlorohydrate as marketed under the trade names aluminium hydroxy chloride by Hoechst Celanese and as Macrospherical 95 by Reheis.

RESIDUE MASKING AGENT

The purpose of the residue masking agent in the compositions according to the present invention is to reduce visual appearance of antiperspirant active on the skin and clothes. Typically emollients such as cyclomethicone are utilised to mask antiperspirant actives. However it has now been found that improved masking can be delivered by selection of specific residue masking agents with refractive indices which closely match those of the antiperspirant active materials. Furthermore it is desirable that residue maskers suitable for use in the compositions according to the present inventions should have low volatility as exemplified by boiling points greater than about 100°C.

A residue masking agent is present in the compositions according to the present invention at levels of from about 1% to about 20%, preferably

from about 5% to about 18%, more preferably from about 8% to about 15% and especially from about 10% to about 13% by weight. The residue masking agents suitable for use in the compositions according to the present invention should have refractive indices greater than about 1.40, preferably greater than about 1.45, more preferably greater than about 1.47 wherein the refractive index is measured using a refractometer.

Preferred residue masking agents suitable for use in the compositions according to the present invention are selected from aliphatic hydrocarbons (e.g. C8-C30, preferably C10-C16, more preferably C12-C15 linear or branched hydrocarbons), aliphatic esters, aromatic esters and mixtures thereof. Suitable masking agents include, isopropyl myristate, polydecene, isoparaffins and mixtures thereof. The preferred residue masking agents for use in the compositions according to the present invention are C8-C30, preferably C10-C16, more preferably C12-C15 mono-and di-alkyl esters of aromatic carboxylic acids inclusive of benzoates and pthalates, especially the benzoate esters, marketed under the trade name FINSOLV TN (RTM) by the Finetex Co. A particular advantage of aromatic ester masking agents in the compositions according to the present invention is that they display excellent dispersion characteristics for the trihydroxystearin suspending agent. The specific combination of masking agent and suspending agent enables the suspending agent to be stabilised during processing without a requirement for extended shearing.

SUSPENDING AGENT

A trihydroxystearin suspending agent is present in the compositions according to the present invention at levels of from about 0.5% to about 4%, preferably from about 1% to about 3.5% most preferably from about 1.5% to about 3% by weight. The suspending agent suitable for use herein can be generally described as an organic gelling agent which is capable of forming a thixotropic gel network in the final composition matrix.

The purpose of the suspending agent in the compositions according to the present invention is to minimise the settling of dispersed actives within the composition matrix. The principal benefits delivered by the suspending

agents are efficient suspension combined with low residue. The specific improvements in matrix suspension are illustrated by reduced clogging of the nozzle and consistent dosing characteristics in aerosol products. A further benefit of the particular suspension agents is that they are non-particulate and as such have reduced gritty skin feel negatives in comparison to more conventional suspension agents such as organo-clays and silica.

The preferred suspension agent for the compositions according to the present invention is trihydroxy stearin available from Rheox, Inc, NJ. USA. under the trade name THIXCIN (RTM).

OPTIONAL EMOLLIENTS

The present antiperspirant composition may comprise optional emollients such as volatile silicone fluids. When present, however, such optional emollients do not total more than about 15% of the composition, and preferably no more than about 10% of the composition. Such optional emollients may be included for a variety of reasons, including both cost-saving, and cosmetic purposes. Typical volatile silicone materials include, but are not limited to, D4-D5 cyclomethicones, phenethyl pentamethyl di-siloxane, and mixtures thereof. Volatile dimethicone fluid is also contemplated herein.

The compositions of the present composition may also comprise a number of non-emollient optional components to provide cosmetic or aesthetic benefits. For example, preservatives, deodorant actives, such as anti-microbials or bactericides, perfumes, colouring agents, fillers, dyes and thickeners may be used. Suitable thickening agents include polyethylene powder manufactured by U.S.I. Chemicals (New York, New York, USA), having a mean particle diameter of less than about 20 microns.

These optional components should be chosen so as not to unduly interfere with the antiperspirant efficacy and the composition stability. Such optional components are generally present in the compositions of the present invention at a level of from about 0.01% to about 20%.

The present compositions are preferably in the form of an aerosol spray. However, the present invention may be applicable to other liquid antiperspirant product types, such as a low-viscosity roll-on liquid. Products formulated as aerosols will also comprise a propellant material. Any of the commonly used propellants in the antiperspirant art are suitable. The propellant can be any liquefiable gas conventionally used for aerosol containers. Examples of materials that are suitable for use as propellants are trichlorofluoromethane, dichlorofluoromethane, trichlorofluoromethane, dimethylether e.g. Dymel 152A (RTM) supplied by Du Pont, propane, butane and isobutane, used singly or admixed and propane butane e.g. CAP 40 (RTM). Dymel 152A and propane butane are preferred.

Compressed gases such as carbon dioxide, nitrogen and air may also be used in aerosol compositions according to the present invention.

The amount of the propellant gas is governed by normal factors as are well known in the aerosol art. The composition described previously herein serves as the concentrate and generally comprises from about 5% to about 80%, preferably 7% to about 45%, more preferably from about 20% to about 40%, of the total aerosol composition while the propellant generally comprises from about 20% to about 95%, preferably from about 30% to about 80%, more preferably from about 40% to about 60%.

If a propellant such as dimethylether utilizes a vapour pressure suppressant (e.g., trichloroethane or dichloromethane) the amount of suppressant is included as part of the propellant.

Although the non-volatile silicone or other silicone fluid, or fluid emollient may suitably serve as a carrier liquid in the compositions hereof, additional materials may also be used, particularly in the case of aerosol compositions. The carrier liquid can aid efficacy by keeping the antiperspirant compound in contact with the skin so that it does not rub off or wash off. Examples of additional materials are alcohols such as lauryl alcohol, hexadecyl alcohol, and oleyl alcohol; carboxylic acids such as

lauric and oleic acid; and lanolin and its derivatives such as acetylated lanolin.

Still other operable carrier liquids are even more hydrophilic than these esters. Among them are polyethylene glycol monolaurate and butoxy-polyoxyethylene oxypropylene glycols (the Ucon 50 HB series; trade mark -- Union Carbide).

These additional carrier liquids, if used, will typically be present in amounts from about 1% to about 15% of the total aerosol composition.

The present compositions may also contain low levels of high molecular weight polymers similar to those described in US-A-4,152,416, May 1, 1979 to Spitzer et al., especially in the case of aerosol compositions. These polymeric materials are used at a level of from about 0.005% to 5% of the total aerosol composition. Preferred materials are high molecular weight silicone gums.

The antiperspirant compositions of the present invention may be manufactured using methods known in the art. In making the compositions, the antiperspirant composition ingredients are typically well-mixed and milled. Aerosol propellant, if applicable, can be included according to standard industry practices.

The remaining components are then added to the composition using conventional formulation methods.

The present invention also provides methods for treating or preventing perspiration and malodour associated with human underarm perspiration. These methods comprise applying a safe and effective amount of the liquid antiperspirant compositions of the present invention to the skin in the auxiliary area of the human. The term a "safe and effective amount" as used herein, is an amount which is effective in eliminating or substantially reducing the production of perspiration which ultimately generates the malodours detected through formation of pungent fatty acids, while being safe for human use at a reasonable risk/benefit ratio.

The liquid antiperspirant compositions of the present invention provide excellent cosmetic attributes both on application and throughout use. They are non-sticky, non-greasy, and provide a dry feel upon application to the skin. The compositions have low incidence of staining of clothes and leaving residue on skin. In addition, the present compositions do not leave substantial levels of white, chalky residue on skin upon dry down, have relatively low incidence of rub-off, and facilitate maintenance of the antiperspirant active material on the skin throughout the in-use period. Furthermore the specific ability of the compositions according to the present invention to re-suspend the antiperspirant active facilitates consistent delivery of the active material to the skin.

The following examples illustrate the present invention.

Examples 1-2

The following compositions are liquid antiperspirant compositions that are useful for roll-on application and are representative of the present invention.

	Example Number (Wt. %)		
Component	1	2	3
Aluminium chlorohydrate	25.0	25.0	-
ZAG	-	-	25.0
Finsolv TN	72.0	71.5	72.0
Thixcin R	1.5	1.5	1.5
Dimethicone (5 cs)	-	0.5	-
Perfume	1.5	1.5	1.5

The compositions are prepared as follows. The dimethicone (if present) and Finsolv are mixed and heated to from about 43°C to about 47°C and the Thixcin is then stirred in over about 5 minutes. After 5 minutes further mixing the batch is homogenised using a J&K T50 Homogeniser fitted with a 25mm medium fine head while keeping the temperature below 50°C. After stirring and cooling to 40°C the aluminium chlorohydrate is added portionwise over 10 minutes. The mix is then stirred and allowed to cool to 30°C and the perfume is then added. Such compositions can be added to conventional roll-on bottles known in the art. The liquid

composition can then be applied to the underarm skin of a human to effectively inhibit perspiration and underarm malodour resulting from perspiration.

The antiperspirant composition provides excellent antiperspirant efficacy with good product aesthetics, residue masking and in-use characteristics.

Examples 4 to 7 illustrate liquid aerosol anitperspirant compositions which are representative of the compositions according to the present invention

	Example Number (Wt%)			
Component	4	5	6	7
Propellant CAP 30	60.0	60.0	60.0	60.0
Cyclomethicone (DC245)	14.8	20.8	12.9	18.9
Finsolv TN	12.0	12.0	12.0	12.0
Aluminiumchlorohydrate	12.0	6.0	12.0	6.0
Thixcin R	0.8	0.8	0.8	0.8
Dimethiconol/dimethicone	-	-	1.92	1.92
Perfume	0.44	0.44	0.44	0.44

The liquid aerosol antiperspirant compositions according to the present invention are prepared as follows. The cyclomethicone and Finsolv are mixed and heated to from about 43°C to about 47°C and the Thixcin is then stirred in over about 5 minutes. After 5 minutes further mixing the batch is homogenised using a J&K T50 Homogeniser fitted with a 25mm medium fine head while keeping the temperature below 50°C. After stirring and cooling to 40°C the aluminium chlorohydrate is added portionwise over 10 minutes. The mix is then stirred and allowed to cool to 30°C and the perfume is then added. This forms a base formula which can then be gassed with an appropriate propellant in a suitable can and valve system.

The aerosol antiperspirant compositions according to the present invention are valuable for providing excellent antiperspirant efficacy with good residue masking and other product aesthetics and consistent dosing characterisics.

CLAIMS

1. An antiperspirant composition for controlling malodour and perspiration comprising :
   (a) from about 0.5% to about 30% by weight of an antiperspirant active material;
   (b) from about 0.5% to about 25% by weight of a residue masking agent having a refractive index of greater than about 1.40; and
   (c) from about 0.1% to about 5% by weight of a trihydroxystearin suspending agent.

2. A composition according to Claim 1 wherein the antiperspirant active material is selected from aluminium halides and aluminium hydroxy halides and mixtures thereof.

3. A composition according to both of Claims 1 and 2 wherein the antiperspirant active material is aluminium chlorohydrate.

4. A composition according to any of Claims 1 to 3 wherein the antiperspirant active material is present at a level of from about 8% to about 17 %, preferably from about 10% to about 15% by weight.

5. A composition according to any of Claims 1 to 4 wherein the residue masking agent is present at a level of from about 1% to about 20%, preferably of from about 5% to about 18%, more preferably from about 8% to about 15%, most preferably from about 10% to about 13% by weight.

6. A composition according to any of Claims 1 to 5 wherein the residue masking agent has a refractive index of greater than about 1.45, preferably greater than about 1.47.

7. A composition according to any of Claims 1 to 6 wherein the residue masking agent is selected from aliphatic hydrocarbons, aliphatic esters, aromatic esters and mixtures thereof.

8. A composition according to any of Claims 1 to 7 wherein the residue masking agent comprises a C8-C30, preferably a C10-C16, more preferably a C12-C15 hydrocarbon.

9. A composition according to any of Claims 1 to 8 wherein the residue masking agent comprises a C8-C30, preferably a C10-C16, more preferably a C12 -C15 alkyl benzoate.

10. A composition according to any of Claims 1 to 9 wherein the suspending agent is present at levels of from about 0.5% to about 4%, preferably from about 1% to about 3.5%, more preferably from about 1.5% to about 2.5% by weight.

11. An aerosol antiperspirant composition according to any of Claims 1 to 10 comprising:
    (a) from about 0.5% to about 30% by weight of an antiperspirant active material;
    (b) from about 0.5% to about 25% by weight of a residue masking agent having a refractive index of greater than about 1.40;
    (c) from about 0.1% to about 5% by weight of a trihydroxystearin suspending agent; and
    (d) from about 20% to about 95% by weight of propellant.

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Patents Act 1977
Examiner's report to the Comptroller under Section 17
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Relevant Technical Fields

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Search Examiner
M T WENDT

Date of completion of Search
26 AUGUST 1995

Databases (see below)
(i) UK Patent Office collections of GB, EP, WO and US patent specifications.

(ii) ONLINE: WPI, CLAIMS, CAS ONLINE, JAPIO

Documents considered relevant following a search in respect of Claims :-
1-11

Categories of documents

X: Document indicating lack of novelty or of inventive step.

Y: Document indicating lack of inventive step if combined with one or more other documents of the same category.

A: Document indicating technological background and/or state of the art.

P: Document published on or after the declared priority date but before the filing date of the present application.

E: Patent document published on or after, but with priority date earlier than, the filing date of the present application.

&: Member of the same patent family; corresponding document.

Category	Identity of document and relevant passages		Relevant to claim(s)
X	WO 94/05253 A2	(BEIERSDORF) eg see Abstract and examples 5, 10 and 14	1, 6-9
X	WO 91/04009 A1	(GILLETTE) eg see page 2 lines 4-1 , page 4 lines 1-24. Claim 1. Examples 1, 3-5.	1-3, 6-9

Databases: The UK Patent Office database comprises classified collections of GB, EP, WO and US patent specifications as outlined periodically in the Official Journal (Patents). The on-line databases considered for search are also listed periodically in the Official Journal (Patents).